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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/725,769	12/02/2003	Stuart M. Lindsay	10060298-2	3836

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EXAMINER	
KO, TONY	

ART UNIT	PAPER NUMBER
2878	

NOTIFICATION DATE	DELIVERY MODE
01/27/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

IPOPS.LEGAL@agilent.com

Office Action Summary	Application No.	Applicant(s)	
	10/725,769	LINDSAY ET AL.	
	Examiner	Art Unit	
	TONY KO	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _09 October 2008_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-13 and 15_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-13 and 15_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. This office action is in response to response filed on 10/09/08. Currently claims 1-13 and 15 are still pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 2, 4, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440, see English translation) in view of Watanabe et al. (5371365).

4. In regard to claims 1 and 12, Funakubo discloses (figs. 1 and 2) a fast scanning stage for a scanning probe microscope, the scanning probe microscope including a probe (page 3, lines 21-30), the fast scanning stage comprising, a fixed support (10, the base), and a sample stage (37) having at least one axis of translation, the sample stage being affixed to the fixed support by means for causing displacement (19 and 39) of the sample stage relative to the probe (page 6, lines 14-34), wherein said means for causing displacement comprises actuator elements (18 and 38) extending between said fixed support (10) and said sample stage (37). Funakubo further teaches the changes in outputting voltages to the piezoelectric actuator (see claim 3, also page 8 lines 14-20). Funakubo fails to disclose a range of voltage values applied to actuate the stage. However, Watanabe discloses a stage (2) having actuators (3,4), wherein 2 volt, less than <u>100 volts,</u> is applied to actuate the stage and applying resonance frequency of

1kHz in the X-piezoelectric element (column 10, lines 13-28). Furthermore, it is well known in the art to drive either a stage or probe at any desired voltage according to the size of the stage and desired amplitude. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a voltage less than 100 volts, as taught by Watanabe, in order to apply voltages to the actuators (18 and 38) to obtain an effective performance and there would have been a reasonable expectation of success from one in the ordinary skill in the art. Funakubo further teaches the varying of resonant frequency of the stage (see page 7 last paragraph and continue to page 8). Funakubo does not teach the scanning stage has resonance stage frequency between 500 hz to 5 khz however recognizes resonant frequency is a result-effective variable (see page 7 last paragraph and continue to page 8). Wantanabe teaches applying resonance frequency of 1k Hz to the sample stage (col. 10, lines 13-28). It is well known to operate scanning stages within the range of 500 hz to 5k hz (e.g. 1k Hz). It would have been obvious to one in the ordinary skill in the art at the time of invention to operate the resonance frequency between 500 hz and 5k hz in order to choose the a resonant frequency appropriate to the measured sample and desired mechanical response (achieve result-effective performance) and there would have been a reasonable expectation of success from one in the ordinary skill in the art. Funakubo further fails to specify the kind of microscope used in the system. However, Watanabe further discloses using an atomic force microscope to measure the properties of a sample (column 16, lines 14-17). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the system of Funakubo in an

atomic force microscope as taught by Watanabe, in order to maximize imaging resolution. In additional to the rejection made above, it is believed that the type of scanning probe microscope, where the fast scanning stage being used, is intended use and is not given patentable weight in an apparatus claim.

5. Regarding claim 2, Funakubo discloses (figs. 1 and 2) a fast scanning stage for a scanning probe microscope, the scanning probe microscope including a probe (page 3, lines 21-30), the fast scanning stage comprising, a fixed support (10, the base), and a sample stage (37) having at least one axis of translation, the sample stage being affixed to the fixed support by means for causing displacement (19 and 39) of the sample stage relative to the probe (page 6, lines 14-34), wherein said means for causing displacement comprises actuator elements (18 and 38) extending between said fixed support (10) and said sample stage (37); the displacement means further include at least one actuator element (38) supporting the stage and a sine waveform generator (fig. 7, 62) for actuating the at least one actuator element (page 5, lines 4-10; page 6, lines 1-3; page 7, lines 19-36; page 9, lines 16-28). Funakubo further teaches the changes in outputting voltages to the piezoelectric actuator (see claim 3, also page 8 lines 14-20). Funakubo fails to disclose a range of voltage values applied to actuate the stage. However, Watanabe discloses a stage (2) having actuators (3,4), wherein 2 volt, less than 100 volts, is applied to actuate the stage and applying resonance frequency of 1kHz in the X-piezoelectric element (column 10, lines 13-28). Furthermore, it is well known in the art to drive either a stage or probe at any desired voltage according to the size of the stage and desired amplitude. It would have been obvious to one of ordinary

skill in the art at the time the invention was made to use a voltage less than 100 volts, as taught by Watanabe, in order to apply voltages to the actuators (18 and 38) to obtain an effective performance and there would have been a reasonable expectation of success from one in the ordinary skill in the art. Funakubo further teaches the varying of resonant frequency of the stage (see page 7 last paragraph and continue to page 8). Funakubo does not teach the scanning stage has resonance stage frequency between 500 hz to 5 khz however recognizes resonant frequency is a result-effective variable (see page 7 last paragraph and continue to page 8). Wantanabe teaches applying resonance frequency of 1k Hz to the sample stage (col. 10, lines 13-28). It is well known to operate scanning stages within the range of 500 hz to 5k hz (e.g. 1k Hz). It would have been obvious to one in the ordinary skill in the art at the time of invention to operate the resonance frequency between 500 hz and 5k hz in order to choose the a resonant frequency appropriate to the measured sample and desired mechanical response (achieve result-effective performance) and there would have been a reasonable expectation of success from one in the ordinary skill in the art. Funakubo further fails to specify the kind of microscope used in the system. However, Watanabe further discloses using an atomic force microscope to measure the properties of a sample (column 16, lines 14-17). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the system of Funakubo in an atomic force microscope as taught by Watanabe, in order to maximize imaging resolution. In additional to the rejection made above, it is believed that the type of

scanning probe microscope, where the fast scanning stage being used, is intended use and is not given patentable weight in an apparatus claim

6. Regarding claim 4, Funakubo discloses (figs. 1 and 2) a fast scanning stage for a scanning probe microscope, the scanning probe microscope including a probe (page 3, lines 21-30), the fast scanning stage comprising, a fixed support (10, the base), and a sample stage (37) having at least one axis of translation, the sample stage being affixed to the fixed support by actuator elements (18 and 38) extending between said fixed support (10) and said sample stage (37); and a sine waveform generator (fig. 7, 62) for actuating the at least one actuator element (page 5, lines 4-10; page 6, lines 1-3; page 7, lines 19-36; page 9, lines 16-28), in which said sample stage is displaced by said actuator elements being driven at the frequency of resonant vibrating corresponding to translation of the sample with respect to the probe (page 5, lines 4-10; page 6, lines 1-34; page 7, lines 19-36; page 9, lines 16-28). Funakubo further teaches the changes in outputting voltages to the piezoelectric actuator (see claim 3, also page 8 lines 14-20). Funakubo fails to disclose a range of voltage values applied to actuate the stage. However, Watanabe discloses a stage (2) having actuators (3,4), wherein 2 volt, less than 100 volts, is applied to actuate the stage and applying resonance frequency of 1kHz in the X-piezoelectric element (column 10, lines 13-28). Furthermore, it is well known in the art to drive either a stage or probe at any desired voltage according to the size of the stage and desired amplitude. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a voltage less than 100 volts, as taught by Watanabe, in order to apply voltages to the actuators (18 and 38) to obtain

an effective performance and there would have been a reasonable expectation of success from one in the ordinary skill in the art. Funakubo further teaches the varying of resonant frequency of the stage (see page 7 last paragraph and continue to page 8). Funakubo does not teach the scanning stage has resonance stage frequency between 500 hz to 5 khz however recognizes resonant frequency is a result-effective variable (see page 7 last paragraph and continue to page 8). Wantanabe teaches applying resonance frequency of 1k Hz to the sample stage (col. 10, lines 13-28). It is well known to operate scanning stages within the range of 500 hz to 5k hz (e.g. 1k Hz). It would have been obvious to one in the ordinary skill in the art at the time of invention to operate the resonance frequency between 500 hz and 5k hz in order to choose the a resonant frequency appropriate to the measured sample and desired mechanical response (achieve result-effective performance) and there would have been a reasonable expectation of success from one in the ordinary skill in the art. Funakubo further fails to specify the kind of microscope used in the system. However, Watanabe further discloses using an atomic force microscope to measure the properties of a sample (column 16, lines 14-17). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the system of Funakubo in an atomic force microscope as taught by Watanabe, in order to maximize imaging resolution. In additional to the rejection made above, it is believed that the type of scanning probe microscope, where the fast scanning stage being used, is intended use and is not given patentable weight in an apparatus claim

In regard to claim 13, Funakubo discloses (fig. 1) a method of operating a fast scanning stage for a scanning probe microscope, the scanning probe microscope including a probe (page 3, lines 21-30), providing a sample stage (17) having a sample thereon and causing displacement of the sample on the sample stage relative to the probe by actuating actuator elements (18 and 38) to drive the stage at the resonant frequency of the sample stage using a sine waveform generator (fig. 4, 62) (page 5, lines 4-10; page 6, lines 1-34; page 7, lines 19-36; page 9, lines 16-28). Funakubo fails to disclose the specific voltage value applied to actuate the stage. However, Watanabe discloses a stage (2) having actuators (3,4), wherein a voltage less than 100 volts is applied to actuate the stage (column 10, lines 13-28). Furthermore, it is well known in the art to drive either a stage or probe at any desired voltage according to the size of the stage and desired amplitude. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a voltage less than 100 volts as taught by Watanabe in order to drive the stage to obtain an effective performance and there would have been a reasonable expectation of success from one in the ordinary skill in the art. Funakubo further fails to specify the kind of microscope used in the system. However, Watanabe further discloses using an atomic force microscope to measure the properties of a sample (column 16, lines 14-17). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the system of Funakubo in an atomic force microscope as taught by Watanabe, in order to maximize imaging resolution. Funakubo fails to disclose that the resonant frequency of the microscope is between about 500 Hz and 5 kHz. However, Watanabe discloses an

atomic force microscope with a resonant frequency between about 500 Hz and 5 kHz (column 10, lines 13-28). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the resonant frequency of the microscope of Funakubo to be between about 500 Hz and 5 kHz as taught by Watanabe, in order to choose the a resonant frequency appropriate to the measured sample and desired mechanical response.

7. Claims 3, 5, 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440, see English translation) in view of Watanabe et al. (5371365) further in view of Sarkar (US 6806991).

8. Regarding claims 3 and 5, Funakubo in view of Watanabe teaches the invention set forth above. Funakubo in view of Watanabe does not teach the use of four actuators. Sarkar teaches (Fig. 2) the use of a fast scanning stage wherein the sample stage has a square or rectangular configuration with four actuator elements supporting the stage (203a-d and 201a-d) at each corner of the stage (column 4, lines 10-49). It is well known to use a fast scanning stage wherein the sample stage has a square or rectangular configuration with four actuator elements supporting the stage (203a-d and 201a-d) at each corner of the stage (column 4, lines 10-49). It would have been obvious to one in the ordinary skill in the art at the time of invention to include a fast scanning stage wherein the sample stage has a square or rectangular configuration with four actuator elements supporting the stage (203a-d and 201a-d) at each corner of the stage (column 4, lines 10-49) to improve durability and stability of the device by having two actuator elements in each x and y axis.

9. Regarding claim 6, Funakubo in view of Watanabe further in view of Sarkar teaches the said actuator elements form a parallelogram scanning element (see Sarkar figure 2).

10. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of in view of Watanabe et al. (5371365), and Sarkar (6806991) as applied to claim 6, and in view of Pai et al. (6338249).

11. Regarding claim 7, Funakubo in view of Watanabe further in view of Sarkar teaches the invention set forth above. Funakubo in view of Watanabe further in view of Sarkar remain silent regarding the actuators being electrically in parallel. However, Pai discloses a system using multiple actuators (20) that are electrically in parallel to move a single element (110) (column 3, lines 5-10). It would have been obvious to one of ordinary skill in the art at the time the invention was made to put the actuators electrically in parallel in order to control the actuators independent from each other.

12. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of Watanabe et al. (5371365), Sarkar (6806991) as applied to claim 3, and in view of Erlings (US RE37560).

13. Regarding claim 8, Funakubo in view of Watanabe further in view of Sarkar discloses a translational stage displaced by piezoelectric stack actuators (see Sarkar page 6, lines 21-25). Funakubo in view of Watanabe, and Sarkar remains silent regarding the actuator being a stack-bending element. However, Erlings teaches that piezoelectric stacks are commonly used in displacing a stage for a scanning microscope (column 1, lines 17-30). It would have been obvious to one of regular skill in the art at

the time the invention was made to include the stack actuators of Erlings to the translational stage of Funakubo in view of Watanabe, and Sarkar to actuate larger displacements.

14. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of Watanabe et al. (5371365), and Sarkar (6806991) as applied to claim 3, and in view of Zdeblick (US 4906840).

15. Regarding claims 9 and 10, Funakubo in view of Watanabe, and Sarkar discloses a stage moveable by at least one piezoelectric stack actuator (page 6, lines 21-25). Funakubo in view of Watanabe, and Sarkar is silent regarding a pzt bimorph actuator. However, Zdeblick discloses a pzt bimorph actuator (cantilever, fig 9) that actuates the tip of a probe (column 2, lines 43-48). It would have been obvious to one of regular skill in the art at the time the invention was made to include the pzt bimorph actuator of Zbedlick to the stage of Funakubo in view of Watanabe, and Sarkar to apply the precise movement of Zbedick's probe to the motion of the stage.

16. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of Watanabe et al. (5371365), as applied to claim 1, and in view of Marchman (US 5811796).

17. Regarding claim 11, Funakubo in view of Watanabe, discloses (fig. 1) a scanning probe microscope with a moveable stage. Funakubo in view of Watanabe, remains silent regarding the material of the stage. However, Marchman discloses a scanning microscope including a probe (column 5, line 22), and a stage (27) having at least one axis of translation and means for causing displacement of the stage relative to the probe

(column 5, lines 57-column 6 line 24). Marchman further discloses the stage (disc, 27)) being made out of a ceramic material (fig 2A, column 6, lines 32-37). It would have been obvious to one of regular skill in the art at the time the invention was made to make the stage of Funakubo in view of Watanabe, and Sarkar out of ceramic material in order to inexpensively produce a durable stage.

18. Claim 15 rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of Watanabe et al. (5371365), and Sarkar (6806991) as applied to claim 13, and in view of the publication of Ando et al (A High-Speed Atomic Force Microscope for studying biological macromolecules).

19. Regarding claim 15, Funakubo in view of Watanabe discloses a stage that is displaced at a resonant frequency. Funakubo in view of Watanabe is silent regarding the stage having a resonant frequency at $1/100^{th}$ of the probe's frequency. Ando teaches the actuator of a scanner having a resonant frequency at 8.5 kHz, 34 kHz, and 100 kHz (paragraph entitled: Imaging Bandwidth). Ando further discloses the probe having a resonant frequency of 2.5 MHz (paragraph entitled: Discussion). This range provided for the ratio of frequencies is provides about $1/100^{th}$. It would have been obvious to one of regular skill in the art at the time the invention was made to actuate the stage and probe of Funakubo in view of Watanabe, and Sarkar in a relationship taught by Ando to increase the imaging bandwidth.

Response to Arguments

20. Applicant's arguments with respect to claims 1-13 and 15 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

21. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TONY KO whose telephone number is (571)272-1926. The examiner can normally be reached on Monday-Friday 7:30 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on 571-272-2328. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TKO

/Georgia Y Epps/

Supervisory Patent Examiner, Art Unit 2878